

PREAMBLE

It is with great honor that we celebrate the achievements of Dr. Samson A. O. Adegoke, the Rector of Osun State College of Technology, Esa-Oke, from 2017 to 2025 and a renowned expert in Housing, Urban Planning and Real Estate Management matters. We intend to publish this FESTSCHRIFT to honor his significant accomplishments during his retirement program from the College. In this context, the theme and sub-themes of the Festschrift unveil issues in Housing, Urban Planning and Environmental Resource Management in Nigeria, reflecting Dr. Adegoke's commitment to advancing knowledge and practice in this field.

The theme of this Festschrift is "*Issues in Housing, Urban Planning, and Environmental Resource Management in Nigeria.*"

Housing and urban development in Nigeria face complex, interrelated challenges that impact both the built environment and the well-being of residents. **Housing deficit and overcrowding** remain persistent issues due to rapid population growth, rural-urban migration, and inadequate housing supply. This crisis is further compounded by **affordability and access to housing finance**, as many low- and middle-income earners struggle to secure mortgages or housing loans, limiting their ability to own or rent decent accommodation. The lack of adequate **infrastructure and basic services in housing areas** worsens living conditions, particularly in informal settlements where water, sanitation, electricity, and waste disposal systems are either unavailable or inefficient. **Legal and policy challenges in housing, such as poor urban planning regulations, bureaucratic bottlenecks, and inconsistent government interventions, often link these issues.** A key consequence of weak policies is **building safety and structural failures**, as devel-

opers, seeking to cut costs, may use substandard materials or bypass regulatory approvals, leading to frequent cases of building collapses.

The growth of **unregulated urbanization and informal settlements** exacerbates congestion, environmental hazards, and social inequalities, making urban areas more difficult to manage. The situation is further complicated by Nigeria's **transportation system and traffic management** challenges, where poorly planned road networks and inadequate public transport services lead to gridlock, air pollution, and reduced economic productivity. A critical aspect of urban planning is **land use and zoning challenges**, where improper land allocation, disputes over land ownership, and inefficient regulatory enforcement hinder organized urban growth.

To address these problems, the idea of smart city development and using technology provides possible solutions by using digital tools, data analysis, and automation to improve city management, building infrastructure, and delivering services.

However, urban areas remain vulnerable to disasters, necessitating **disaster management and climate resilience in urban areas** to mitigate risks from flooding, extreme weather events, and other environmental threats. A direct consequence of poor urban planning is **deforestation and green space depletion**, where natural landscapes are replaced by unregulated development, contributing to rising temperatures, biodiversity loss, and increased vulnerability to climate change. Such development leads to problems such as **flooding and erosion control**, where improper drainage systems and land degradation heighten the risk of floods and landslides, particularly in coastal and riverine communities. Another major urban challenge is **environmental pollution control and management in urban**

centers, as cities grapple with air, water, and noise pollution due to industrial activities, vehicular emissions, and poor waste disposal.

Addressing these concerns requires efficient **energy resource management and sustainability**, promoting cleaner energy sources and reducing reliance on fossil fuels. However, **illegal resource exploitation and environmental degradation**, such as sand mining, deforestation, and oil spillage, continue to threaten ecological balance and urban sustainability. At the heart of these environmental issues is **climate change and urban resilience**, as cities must adopt policies that enhance their capacity to withstand and adapt to climate-related shocks. A crucial barrier to urban development remains **the land tenure system and property rights in Nigeria**, where complex and unclear land ownership struc-

tures hinder investment, infrastructure development, and property security. These issues also affect **real estate financing and mortgage accessibility**, where financial institutions hesitate to provide loans due to land ownership uncertainties.

Finally, achieving sustainable urban growth requires **sustainable waste management in Nigerian cities**, as improper waste disposal contributes to pollution, health risks, and environmental degradation. Addressing these interwoven challenges demands coordinated policies, innovative solutions, and active stakeholder engagement to ensure sustainable, livable, and resilient cities in Nigeria.

Dr. Mabel E. Adeosun

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SUSTAINABLE SOLID WASTE MANAGEMENT: AN OVERVIEW OF CONTRIBUTIONS OF PUBLIC AND PRIVATE SERVICE PROVIDERS IN SOUTH-WESTERN NIGERIA

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Abstract: *The study provides an overview of public and private waste management agencies/ corporations in Southwestern Nigeria, with special focus on Lagos Waste Management Authority (LAWMA), Oyo Waste Management Authority (OYWMA) and Wecylers and Wastepoint operate Waste Management System. Secondary data obtained from the government, and the private waste management organisations, complemented with current relevant literature were sourced and used in anchoring the study. The study found that decentralization of waste management through economic progress led to new job creation combined with the affordable waste solutions; multiple barriers delayed sustainable waste management programs execution because policymakers lacked effective implementation; the infrastructure was insufficient; and communities showed minimal involvement. The study affirmed the requirement for waste policy implementation to gain further authority so it can function effectively with established public-private partnerships and additional investments in waste recycling facilities and waste-to-energy installations. The study recommended starting educational initiatives which teach sustainable waste management basics while simultaneously implementing programs designed to develop responsible waste operation consciousness. Future research should be quantitative studies evaluating how artificial intelligence systems together with smart technology can enhance waste management operations in Nigeria.*

Keywords: Sustainable, Waste, Management, Economic, Viability.

1. Introduction

The practice of sustainable waste management delivers a waste system for appropriate disposal to reduce environmental destruction while maximizing resource efficiency. The improper disposal methods Nigerians use to dispose their waste create extensive environmental threats combined with health hazards, which ultimately produce major economic troubles. Economic benefits will emerge from waste-to-energy programs and recycling operations and composting activities since they combine environmental sustainability and economic benefits.

Sustainable waste management practices create full alignment with United Nations Sustainable Development Goals SDG 11 and SDG 12 by focusing on sustainable urban areas and responsible consumption and production, respectively.

The study evaluates Nigeria's economic sustainability in relation to waste management, focussing specifically on Southwest Nigeria through investigation of governmental and private sector examples. The annual waste production in Nigeria reaches 32 million tons, but Lagos generates 13,000 tons per day. Government-led attempts have shown to be inadequate for

solving the problem of inadequate waste management that presents environmental risks and generates economic complications. Private businesses participating in waste processing activities offer economic advantages for development through their efforts in waste disposal activities. The waste sector continues to face active problems consisting of inadequate infrastructure and unaware public users and legal policy gaps (Akinyemi & Olorunfemi 2021).

Nigeria faces rising population growth and urbanization speed as the main drivers behind substantial waste output increases in the country. Economic development along with environmental sustainability experiences difficulties because waste management systems do not function efficiently, and sustainable practices have not reached sufficient levels. Government programs continue to fail in effectiveness since policy execution remains weak while technology spreads minimally and funding remains insufficient. Although private waste management entities face regulatory barriers along with public unawareness, their presence continues to grow (Adebanjo & Olawale, 2022). The paper examines Southwest Nigeria's economic waste management sustainability through assessments of public and private sector activities and economic efficiency factors to determine policy performance strengthening methods. The research studies waste management programs through public and private sector programs in Southwest Nigeria states comprising Oyo, Ogun, Ondo, Lagos, Ekiti and Osun. The study contains an analysis of LAWMA with OYWMA alongside evaluations of both Wecyclers and Wastepoint as private entities. Governmental reports as well as industrial publications and academic research serve as the foundation for

evaluating current industrial developments and sector obstacles throughout the industry.

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Concept of Sustainable Waste Management

The organized structure of sustainable waste management systems reduces environmental destruction and maximizes

resource allocation to establish social prosperity and economic growth (Wilson et al., 2021). The approach combines multiple waste handling approaches to achieve waste minimization by implementing waste reduction alongside reuse and recycling followed by recovery in order to surpass random landfilling or incineration practices. Sustainable waste management practices use environmental sustainability to combine with economic viability while demonstrating social responsibility which avoids future population restrictions (Pires, Martinho, & Chang, 2020).

Sustainable waste management functions as a core structure for circular economy progress by creating new raw materials from waste recycling according (the European Environment Agency, 2021). Sustainable waste management creates recycling systems that allow resource reuse instead of traditional linear systems which perform take-make-dispose operations. United Nations SDGs unite with Goal 12 through responsible consumption and production principles to develop sustainable waste management as a sustainable development concept (UNEP, 2022).

Principles of Sustainable Waste Management

Walsh (2021) outlines various fundamental principles which guide the development of sustainable waste management policies around the world. Waste prevention operates as the fundamental approach to build sustainable waste management systems. Manufacturing designs need to achieve efficient material utilization together with minimal waste output from product development activities. Sustainable design along with environmentally friendly packaging systems ordered with optimal resource allocation, according to

Kirchherr and his co-authors Reike and Hekkert (2019), minimizes waste generation. Companies receive incentive from the Environmental Protection Regulation (EPR) framework to create waste-minimizing final-life products as it acts as a manufacturing instrument (Ghisellini, Ripa, & Ulgiati, 2020). According to the Ellen MacArthur Foundation (2021) a circular economy represents resource conservation at the highest value point by incorporating material and product recovery and generative production methods. Manufacturers within this system can combine their remanufacturing processes with up cycling and material recovery to stop waste destruction. Waste Hierarchy uses environmental impacts to develop systematic waste management strategies by providing a foundation for their systematic organization.

Prevention: Avoiding waste generation through design and consumption practices.

Product life extension happens through maintenance duties and functional and purposeful re-refurbishment operations.

The recycling process takes waste materials to produce brand-new products, which decreases the need for obtaining materials from their raw state.

Ethical power generation from garbage takes place through the combination of incineration together with anaerobic digestion.

The two waste disposal options for the least preferred choice consist of landfill disposal and non-energy recovery waste combustion according to European Commission (2022).

Manufacturers have complete liability for their products from manufacturing through

disposal under Extended Producer Responsibility framework guidelines. Producers using this system need to design eco-friendly products and establish facilities for waste recycling as described in (Wilson et al., 2021). Public involvement with sustainable waste management operations needs essential educational initiatives to achieve goals by improving consciousness across the population. The combination of community waste programs together with educational initiatives along with governmental waste policies makes people responsible waste disposers (Gómez et al., 2021).

Best Practices in Sustainable Waste Management

Multiple successful waste management approaches operate across the world to build environmentally sound waste dumping frameworks.

Waste prevention stands as an essential operational part of integrated waste management systems in Swedish and German waste management facilities (European Environment Agency, 2021). The Waste-to-Energy facilities in Japan and Denmark process non-recyclable waste materials into thermal energy while producing heating power for reduced reliance on landfills (Ghisellini et al., 2020). Under Decentralized Waste Management, Indian and Nigerian communities learn to build workforce opportunities by recycling waste products and creating compost in addition to environmentally sustainable practices (Wilson et al., 2021). Governmental teams using robust waste policies in Canada as well as the Netherlands enhance waste management capabilities by implementing recycling standards (Pires et al., 2020).

Sustainable Waste Management Companies in Southwest Nigeria

The SW Nigerian business community implements waste management systems which reduce pollution by circular economy standards while developing their economic zones. Member-based programs and energy production alongside waste collection form part of the operations conducted by waste management organizations to advance sustainable waste practices for communities.

LAWMA stands as the Lagos Waste Management Authority, which the government created to maintain active control over trash collection and disposal measures, as well as recycling operations across the entire state territory. Global environmental standards depend on LAWMA for maintaining correct waste management operations in the country. LAWMA conducts standard garbage collection services as it operates landfills alongside recycling operations to execute required sanitary regulatory measures. The activities of LAWMA resulted in decreased waste dumping violation's alongside public waste education and jobs creation for waste management services.

WestAfricENRG supports the existing waste-to-energy and recycling operations throughout Nigeria. The company operates business processes which turn waste materials into marketable assets and protect both natural environments and environmental sustainability. The company operates waste-to-energy facilities and runs plastic recycling services and metal recycling services together with multiple material recovery facilities (MRFs). WestAfricaENRG enables Nigerian renewable energy through waste-based power operations and minimized landfill waste, coupled with business

support created through recycled raw material programs.

RecyclePoints Nigeria developed a recognition system which stimulates community members across diverse residential areas to participate in recycling efforts. Household garbage consisting of plastic, paper, aluminum, and glass materials creates reward points at RecyclePoints Nigeria that users can turn into cash payment or electrical products. The company operates recycling facilities from its hubs to execute recycling programs and sustainability education programs which teach waste reduction approaches to the public. Through this new model, both participation in community recycling increased, and plastic area reduction became possible alongside the opportunity for industrial producers to utilize recycled materials.

GIVO Africa (Green Innovation Ventures) establishes the main purpose of developing circular economy alternatives by running waste plastic recycling programs. The organization employs modern technology to transform waste products into sustainable items as part of its recycling advancement process at GIVO Africa. Plastic waste recycling operations serve as the main business activity at the same time the company utilizes AI controllers in waste management systems and follows plastic reduction guidelines to guide its operational activities. The organization pursues three main targets to minimize plastic waste in cities and establish circular economy systems and develop waste management technologies that improve collection operations.

ZL Global Alliance Nigeria Ltd delivers waste collection solutions and waste recycling services and waste management solutions in the state of Oyo. ZL Global

Alliance Nigeria Ltd works jointly with public organizations to build better waste management frameworks, which also lead to advanced construction approaches. The company conducts waste processing before waste sorting and recycling and distributes waste management services among community partners. Better waste collection services and enhanced recycling participation and newly created waste management jobs became achievements in this sector.

WeCyclers operates a recycling fleet through its platform that collects waste from areas not connected to the public waste system through low-cost bicycle and tricycle service units. The payment incentive system enables staff members to properly break down waste items that get collected. The waste collection system of WeCyclers became more efficient through their business partnerships, while awareness programs helped reduce plastic waste build-up while generating jobs for disadvantaged communities.

Earth Care Nigeria Ltd functions as a facility which transforms organic waste materials into agricultural fertilizers through its organic waste processing methods. The company gathers organic waste from public markets together with agricultural sources and domestic areas to create premium compost products which benefit sustainable agriculture management. Earth Care Nigeria Ltd provides sustainable agricultural leadership by optimizing landfill waste power generation, and it simultaneously improves soil conditions and establishes green career opportunities.

Sustainable waste management continues in Southwest Nigeria because local organizations build innovative waste conversion methods which unite energy

generation with recycling processes and public outreach initiatives. Their programs enable environmental sanitation services by using economic development methods to advance public wellness. The regional waste management programs need sustained longevity because government support maintains their sustainability as infrastructure expands with active community engagement.

Cost Implications of Waste Management

The economic advantages of waste management for businesses need financial support, which results in operational costs.

Businesses need to allocate substantial initial funding to establish waste treatment and recycling facilities because they require extensive facilities and equipment alongside training their staff (Pires et al., 2020).

Financial support is continuously needed for waste collection and transportation system maintenance and persistent sorting and processing functions to fulfil their budgetary needs. The main expenses in waste management are staff compensation together with expenditure for logistics activities (Gómez et al., 2021).

Organizations within waste management must submit to periodic inspections while documenting their operational procedures under environmental directives that also require auditing procedures. Non-compliance leads to significant penalties for businesses as their reputation diminishes substantially, as stated by Wilson et al. (2021). The deployment of advanced waste management technologies accompanied by waste-to-energy processes together with automated sorting systems produces substantial initial expenses and

continuing maintenance expenses (European Commission, 2022).

Sustainability and Economic Growth

Waste management that protects the environment allows economic advancement by creating employment opportunities and permitting money conservation for environmental repairs. Through green technology paired with circular economy systems and sustainable practices, the economy gains sustainable stability because these methods produce higher yields while minimizing resource demand (European Environment Agency, 2021). Studying waste management in conjunction with industrial innovation demonstrates process enhancement capabilities for profit growth, according to Smith et al. (2021) and Johnson & Lee (2022). Sustainable waste management systems establish new markets made from recycled materials according to Ahmed & Bello (2023) and Carter et al. (2023) which supports regional business expansion. The research of Green et al. (2022) and Martinez (2023) confirms that environmentally-conscious businesses drive in foreign investment which subsequently increases national economic power.

Concept of Economic Viability

A business operation or economic project needs sufficient financial revenue alongside long-term operability to qualify as economically viable (Smith et al., 2021). Financial sustainability tests combine cost-effectiveness from a revenue perspective to establish whether operations will survive independent of serious financial discomforts. Business sectors together with infrastructure management and energy production and waste disposal operations widely employ this concept. Economic viability for waste management

requires operations in waste collection and recycling and disposal and recovery to maintain environmental responsibility with financial sustainability (Jones & Thompson, 2022). Waste management projects need financial independence that allows them to fund operations without dependency on outside sources. Continuous government or external funding without achieving financial self-sustainability makes a waste management system economically unviable for future development.

The economic viability factor becomes essential for sustainability projects since maintaining fiscal gains while managing environmental and social requirements proves to be difficult. Stakeholders and government bodies and private entities must assess sustainable waste handling methods against financial effectiveness alongside economic contribution development (Wilson et al., 2021). Decision-makers use knowledge of economic viability to assess how feasible various waste management methods such as recycling facilities and waste-to-energy initiatives and composting installations can be implemented.

Key Components of Economic Viability

Several important factors characterize economic sustainability for activity initiatives especially within waste management fields and environmental preservation strategies. These elements establish how well a project can support itself economically and provide worth to its stakeholders.

Cost-Benefit Analysis (CBA)

Cost-benefit analysis (CBA) stands as the main approach for conducting economic viability assessments. To perform this evaluation, one must compare all project expenses with expected financial returns

together with environmental advantages. The decision depends on how much the estimated advantages exceed the expenses which makes a project financially workable (European Commission 2022). Waste management CBA analyses the collection expenses as well as recycling revenue alongside long-term savings from reduced landfill dependence and environmental effect reduction (Gómez et al., 2021).

Revenue Generation Potential

Economic sustainability depends primarily on the ability to produce financial income. Environmental waste management operations establish new revenue streams by implementing recycling processes and both compost-based operations and transforming waste into energy (ILO, 2021). Organizations worldwide and companies have adopted circular economy systems for waste reutilization to cut material expenditure and create profit streams through recycled product sales (Ellen MacArthur Foundation, 2021). The material sell-offs from recycling sectors drive sustainability funding in countries that operate advanced recycling operations.

Return on Investment (ROI)

Prior to waste management participation businesses and investors calculate expected return on investment (ROI). Several factors determine how successful a project performs financially through assessment of its total return against the original investment costs (Pires et al., 2020). A waste management project employing sustainable revenue models from recycled materials sales or carbon credit generation and waste-to-energy electricity production maintains better economic sustainability beyond initial funding sources.

Operational and Maintenance Costs

Waste management sustainability extends over the long term when costs for operation and maintenance are properly managed. Waste collection combined with transportation as well as sorting and processing operations demand consistent monetary support because they need constant capital infusion. Despite possible government funding benefits, businesses need to maintain operational spending below revenue levels (Wilson et al., 2021). The application of affordable technology and optimized logistics operations together with shorter waste transportation distances makes economic survival easier through expense reductions.

Scalability and Long-Term Sustainability

A sustainable financial model exists when the business generates lasting profits in addition to short-term economic success. Projects that demonstrate adjustable capabilities toward growing waste levels while adapting regulation changes along with technical improvements prove more financially sound than revenue sources that remain unstable (Wilson et al., 2021). Waste-to-energy facilities need to evaluate both waste availability for the long term and government policy changes about renewable energy before making financial feasibility assessments.

Government Policies and Incentives

Sustainable waste management enterprises achieve financial success because they obtain assistance from public bodies through economic support mechanisms and policy frameworks. Businesses receive two key financial motivators from government programs: landfill tax legislations and extended producer responsibility (EPR) programs (Jones &

Thompson, 2022). Supportive government policies represent essential elements for waste management projects because market conditions might not deliver enough profit to maintain operations.

Market Demand for Recycled Materials

Financial sustainability of waste management programs directly depends on the level of demand for recycled materials. Rising and falling commodity market rates affect how profitable recycling businesses become. The market decline of recycled plastics or metals causes monetary setbacks which render recycling businesses financially unsustainable (Kirchherr, Reike, & Hekkert, 2019). Guaranteeing market stability happens through governmental regulations which enforce requirements for industrial usage of recycling percentages during manufacturing processes.

Technological Advancements and Innovation

An organization's financial stability depends heavily on implementing state-of-the-art technologies which optimize operations and decrease operational expenses. Automation in waste sorting combined with artificial intelligence waste categorization technology and waste conversion methods help lower waste management expenses (Ghisellini et al., 2020). The economic evaluation of required initial financial outlays must happen before firms implement these technologies.

Challenges to Economic Viability in Waste Management

The numerous benefits of sustainable waste management encounter multiple complications on the way to economic sustainability.

The process of creating waste treatment and recycling facilities needs considerable financial support above all else to buy infrastructure and skilled workforce along with the necessary machinery (Ghisellini et al., 2020). The lack of certain profit guarantees prevents many projects from finding suitable financial partners for their initiatives. Recycled product prices within local and international markets determine the financial success of recycling businesses (Kirchherr, Reike, & Hekkert, 2019). Prices that decline in the market adversely impact the financial viability of recycling operations.

The adherence to strict environment regulations makes waste management companies invest significant funds for their compliance standards. Although environmental regulations protect sustainability, they create increased financial expenses for business operations.

Sustainable waste management requires the general population to actively participate while remaining aware of relevant processes. Recycling operations become more expensive when public members fail to support recycling programs or neglect waste disposal protocols (European Environment Agency, 2021).

Sustainable waste management theory derives its basis from three essential principles which unite circular economy theory with waste hierarchy model and environmental economics. The Ellen MacArthur Foundation (2023) defines the circular economy theory through its application of material reuse and sustainable production methods together with recycling for waste reduction. The waste hierarchy model chooses waste minimization as its primary stage, followed by reuse and recovery activities above landfill disposal for protecting resources

and the environment (Pearce & Turner, 2022). Waste Management policies undergo cost-benefit evaluation under environmental economics to demonstrate economic motivations behind sustainable waste practices (Harris & Roach, 2023). The theoretical perspectives create a comprehensive explanation regarding how waste management practices impact economic systems as well as natural environments of Nigeria.

Several research investigations conducted multiple studies that examine waste management problems along with their appropriate solutions in Nigerian communities. According to Adedokun et al. (2022) government policies regarding waste management experience substantial implementation problems due to limited funding combined with insufficient legislation. Through waste recycling programs which the private sector established as per sustainable economic returns became possible. Olayemi & Bello (2022) discovered problems with improper waste disposal procedures damaging both public health and environmental systems and proposed new policies together with educational programs for improvement. Johnson & Adebayo (2023) demonstrated how waste-to-energy initiatives lead to productive non-renewable energy resource reduction in Nigeria. The research articles contain key findings, yet they fail to link the performance outcomes of private waste management practices and public operations towards achieving sustainability targets. Therefore, this investigation analyses both public and private waste management systems that enable sustainable waste practice implementation in Southwest Nigeria.

This study employs a qualitative design through content analysis. The research depends on government reports and policy

documents as well as academic journals and industry publications for secondary data collection procedures and examines waste management practices throughout Southwest Nigeria to comprehend how government institutions and private companies develop enduring economic worth from their approaches. Secondary data comes from various governmental departments and NGOs as well as relevant publications with industrial industry data. The research requires in-depth evaluation of selected waste management projects to obtain its findings. The study examines waste management methods used by LAWMA and OYWMA as public-sector operators; and Wecyclers and Wastepoint as private-sector waste management providers. Three groups of evaluation factors combine to form the assessment criteria where economic measures and success rates together with employment number metrics unite with sustainability performance indicators.

Findings and Discussion

Research demonstrates that sustainable waste management plays an essential role to support economic viability especially in Southwest Nigeria through public-private waste management initiatives. The examination of LAWMA, and OYWMA (public-sector providers), and Wecyclers and Wastepoint (private-sector providers) shows both primary economic characteristics and main policy restrictions and obstacles.

Economic Viability

The combination of innovative job positions through sustainable waste management generates higher economic revenues together with enhanced operational efficiency. The waste management programs of LAWMA enabled the agency to hire thousands of workers who operate

within the public waste collection sector while participating in recycling initiatives as well as waste-to-energy operations. Wecyclers uses financial compensation to recruit individuals from low income areas who create illegal working roles. The ability to generate profits by recycling waste represents the core discovery. The recycling industry located in Lagos delivers millions of naira through yearly economic impacts according to research by Okafor and Ojo (2023). The recycling process of plastics, paper, alongside metals, paves the way for business establishment which simultaneously avoids raw material extraction for new product creation. The newly established waste-to-energy projects in Nigeria demonstrate how they can produce electricity together with cheaper energy expenditures (Uche & Akinwale, 2023).

For any operation's economic sustainability to thrive it requires operations that deliver efficient costs. Economically effective waste management systems decrease waste disposal costs and establish healthy environments together with conserved natural integrity. Successful waste recycling programs in communities lead to decreased healthcare expenses since improper waste management diseases are reduced (Olawale & Adebisi, 2023). The existing structural weaknesses across Nigeria prevent the nation from attaining its maximum economic potential through sustainable waste management practices.

Challenges

This study encounters its most significant hurdle in regard to uneven policy execution. Waste management regulations remain unapplied primarily because enforcement systems lack proper execution mechanisms. The deficiency of

government enforcement results in both financial restrictions and missing technical capabilities for agencies to monitor compliance, thus damaging waste management performance (Olufemi & Adeyemi 2022). A lack of proper infrastructure represents a fundamental challenge for the management system. Present waste collection and recycling facilities lack the capacity to handle the increasing population of urban environments. Waste sorting and processing pose critical difficulties for various Nigerian cities due to their absence of fundamental processing centers (Adebanjo & Olawale 2022). Well-ordered landfill facilities are necessary to fight environmental pollution and maximize waste disposal effectiveness. Most people fail to participate actively in waste management sustainability because they lack proper understanding yet receive no benefits for their work. The lack of proper waste dumping order on surface areas leads to declining achievement rates in recycling operations. The conventional cultural attitudes toward waste management create barriers because individuals mostly view waste negatively instead of recognizing its economic worth (Smith & Adeolu, 2021).

Policy Implications

Better economic value in waste management requires comprehensive policies which combine enforcement standards and explicit regulations. Better financial support for waste management institutions combined with stricter oversight from institutions leads to enhanced waste services. The essential aspect for effective waste management requires substantial investment into infrastructure systems. Together, government institutions and the private sector must establish a unified effort to develop modern recycling plants along with effective waste collection

methods along with waste-to-energy facilities. The recycling business receives tax incentives as well as waste-to-energy projects secure subsidies so they can attract private sector involvement (Brown et al., 2023). Creating entire public outreach initiatives for waste management education must remain at the forefront to spread waste management knowledge throughout society. The successful transformation of community behaviors through recycling benefits communication and performance-based waste management systems has been demonstrated by Wilson and Thompson (2021) Educational institutions and schools need to place waste management instruction as mandatory curriculum content to train students about environmental stewardship.

Conclusion and Recommendations

Sustainable waste management in Nigeria improve economic viability because they establish jobs and create financial income, which also lowers operational expenses. The benefits supplied by these methods can reach maximum potential regardless of various implementation challenges such as policy breakdowns and subpar infrastructure and minimal community involvement. Wecyclers and Wastepoint established that private sector entities must actively participate in waste management actions as co-partners with the LAWMA and OYWMA programs. Based on the conclusion, the following recommendations are hereby made:

The government should endeavour to strengthen waste policies by developing strict requirements and deployment strategies and provide extra financial support for infrastructure expansion together with technological systems. The government needs to develop partnership programs between public organizations

and private businesses to support funding for waste-to-energy technologies together with waste recycling centres. Organizations practicing sustainable waste management must implement recycling systems together with biodegradable packaging, while developing partnerships between NGOs and government departments for primary waste sorting education. Modern business strategies are necessary for low-income areas because these approaches need to achieve profitable operations and universal recycling access at the same time.

Stakeholders particularly communities and NGOs should increase their monetary support for public awareness development of sustainable waste management and this improvement will persist through localized waste collection programs that produce increased participation for long-term sustainable initiatives.

Future Research

Artificial Intelligence along with smart technologies require further study to determine their potential benefits in enhancing waste management operations in Nigeria. The study of waste management systems in countries known for their successful waste management practices alongside quantitative investigations of sustainability economics will strengthen policy decisions for waste management in Nigeria.

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